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U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER
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STEERBEAR 3 WITH INTERACTIVE GRAPHICS

Kai Holmgren
Managing Director
Kokums Computer Systems AB

Mr. Holmgren's main task is supervision of the integrated computer-based systems STEERBEAR and SYSTEM Q, which are used at Kokums and at a number of other yards throughout the world. He holds a degree in Economics. Past experience includes the position of system analyst at the Swedish Aircraft Company, and head of engineering computer applications at the Swedish Aero-engine company.

ABSTRACT

The development of the next generation of STEERBEAR (SB 3) is underway. The efforts are concentrated on general basic software adapted to interactive graphics and suited to a variety of applications and in particular to a new STEERBEAR HULL system (SBH 3). The main new features of SBH 3 will be:

• Interactive graphics available where feasible.
• Improved facilities for generation and handling of three-dimensional curves and surfaces.
• Parametric design modules covering more complex elements than in SBH 2.
• Improved facilities to create and use a 'product description'.
• Distribution of the computer work between main frames, mini- and microcomputers.

A system work station is composed of a Digital Equipment microcomputer, a Tektronix storage tube with refresh capability, an alphanumeric screen and a graphic tablet. Basic graphic software has been developed and is operational on the work station. Within a few months the system work station will be used to present graphic output from SBH 2. The computers used are a PDP 11/34 and an IBM main frame.

During the first quarter of 1981 a system for interactive working drawing composition will be in operation connected to SBH 2. Text and drawings generated by the current structure generation system can be combined and supplemented at the work station and then be returned to the main frame for further processing. The total development program of SBH 3 including basis interactive fairing and interactive nesting will be finished before the end of 1982.
Kockums Computer Based Systems
The panel concept
Tripping bracket

Input:
- Connection code
- Longitudinal number
- Thickness
- Side
- Quality

Result:
The bracket generated and stored
STEERBEAR HULL
- Body plan
- Material specifications
- Bending templates
- Jigs
- Working drawings
- Manufacturing lists for profiles
- Weight and centre of gravity
- 2- and 3-axis NC-flame-cutter tapes
- etc

INTERACTIVE DESIGN SYSTEM
- Parts generation
- Nesting
- Check drawings

STEERBEAR CONTROL
- CNC-controlled manufacturing of panels including variable bevel angle cutting, marking etc
Complete nesting
### Longitudinal bending table

![Diagram of bending table]

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**HOLE**

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STEERBEAR PIPE
- Data Bank Structure

SHIP

BLOCK

COMPONENTS AND PIPES

PIPE SYSTEM
Requirements on Engineering

Lower design costs

Engineering

Shorter lead times

Earlier supply of adequate information to planning, scheduling, material ordering etc.
Computerized Drawing Oriented System

Two different systems or two isolated functions of one system

The product is represented in the system as drawings.

Great efforts required to create production information.
Computerized Product Oriented System

One integrated system with a common data base for all functions.

The product is represented in the system as a product description, ie a physical (in 3D) and functional description with connected administrative data.

Drawings and other production information are derived from the product description.
Comparison

Drawing oriented system

Product oriented system
Why a New System?

New possibilities

New computer techniques
New methods

System

Experience

Requirements
New Computer Techniques

Computer networks

Distributed data processing

Interactivity
System Components

- Man-machine communication
- Design language
- Standards
- Design modules
- Data bank with product description

BRACKET, A, L27, AFT,
MTRL = 23, QUAL = B, POS = 124;
New Methods

PRODUCT DESCRIPTION:

Units

Panels

Absolute units, unique for each ship

RULES FOR:

Design modules

Standards

Parametric units, universal
Design Modules

- Design language
- Parameters,...
- Surrounding geometry
- Standards

Design module

Principle description of a bottom web

Unique bottom web
System Concept

- System work station
  - Alphanumeric screen
  - Graphic screen
  - Graphic tablet
  - Plotter

- Design language
  
- Product description (data bank)

- Production information, management information etc
Hardware Configuration - Alternatives

Main frame

Mini

System work station incl. micro
New Functions in STEERBEAR HULL 3

- Material ordering, planning, etc.
- Pre-design
- Detailed design
- Production information

STEERBEAR HULL 2

STEERBEAR HULL 3
## System Development

<table>
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<tr>
<th>Basic software for general technical applications</th>
<th>Interactive communication</th>
<th>Product description handling</th>
<th>Geometry handling</th>
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<tbody>
<tr>
<td>STEERBEAR HULL 3</td>
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Applications
Implementation Schedule for STEERBEAR HULL 3

- System work station
- Graphical RJE - station to STEERBEAR HULL 2
- Working drawings for STEERBEAR HULL 2 and 3
- Basic software
- Structure generation
- Fairing
- Nesting

1980 | 1981 | 1982